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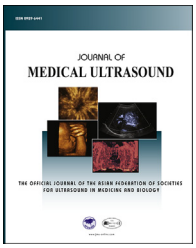

CASE REPORT

Point-of-Care Ultrasound in Diagnosis and Treatment of Luxatio Erecta (Inferior Shoulder Dislocation)

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KEYWORDS
luxatio erecta,
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Abstract *Background:* Point-of-care-ultrasound (POC-US) is an increasingly popular tool in the assessment of a wide variety of emergency department patients. In this case report we discuss how POC-US aided in the diagnosis and treatment of inferior shoulder dislocation, a rare presentation of a common emergency department complaint.

Case Report: A 69-year-old female presented to the emergency department with severe shoulder pain after a ground level fall. Her arm was held overhead with her shoulder trapped in abduction. POC-US confirmed the diagnosis of inferior shoulder dislocation, guided glenohumeral intraarticular anesthesia, and confirmed successful reduction.

Why an emergency physician should be aware of this: POC-US is a useful tool for the emergency physician when confronted with shoulder dislocation. US not only confirms the dislocation, but also differentiates between anterior versus posterior versus inferior dislocation. POC-US can guide the placement of intraarticular lidocaine for anesthesia which then potentially reduces time, expense, and risk of procedural sedation. Finally, POC-US may reduce failed reductions by providing immediate visual confirmation and in the case of reductions performed under sedation, may prevent the need for repeat sedation.

Introduction

Luxatio erecta is the rarest type of shoulder dislocation. A 69-year-old female presented to the emergency department with severe shoulder pain after a ground level fall. Her arm was held overhead with her shoulder trapped in abduction. Point-of-care ultrasound (POC-US) confirmed the diagnosis of shoulder dislocation, guided intraarticular

Conflicts of interest: Dr Dina Seif provides education consultation for *SONOSITE*.

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anesthesia and confirmed successful reduction. The US findings of luxatio erecta and technique of US-guided intraarticular anesthesia are reviewed here.

Case Report

A 69-year-old female presented to the emergency department (ED) 1 hour after a ground level fall. She described tripping over a rug and grabbing a nearby chair with her outstretched right arm. Her shoulder was trapped in full abduction causing a significant amount of pain. Vital signs were: heart rate 81 beats/min; respiratory rate 18 breaths/min; blood pressure 159/88 mm Hg; temperature 36.5°C. A review of systems was otherwise negative.

Physical examination revealed a well perfused right upper extremity with normal radial pulse. Sensation to light touch was intact over the axillary, radial, ulnar, and median nerve distributions. The shoulder was fixed in full abduction with elbow flexion. A bony prominence was palpated in the inferior axilla. An intravenous (IV) catheter was placed and she was given IV morphine for pain control while awaiting radiologic imaging.

US findings and technique

POC-US was performed by the Emergency Physician to evaluate for shoulder dislocation using the M Turbo Sonosite US machine. First, the unaffected glenohumeral joint was imaged. With the patient in an upright, seated position, a 5—2 mHz curvilinear transducer was placed over the posterior shoulder, and with the indicator pointed towards the patient's right in musculoskeletal mode. In general when using US to visualize the shoulder, the probe marker should be oriented laterally to the patient. The transducer was positioned parallel to and just below the scapular spine at the level of the glenoid (Figure 1) [1]. The humeral head was seen as a bright or hyperechoic circular structure articulating with the glenoid. (Figure 1). Next, the affected shoulder was imaged (Figure 2). One can see an empty glenoid fossa with hematoma filling the space. In the setting of anterior shoulder dislocation, the humeral head is seen in the lower portion of the screen as it is further away from the transducer. Conversely, in a posterior dislocation, the humeral head is positioned closer to the transducer and will be seen at the top of the screen.

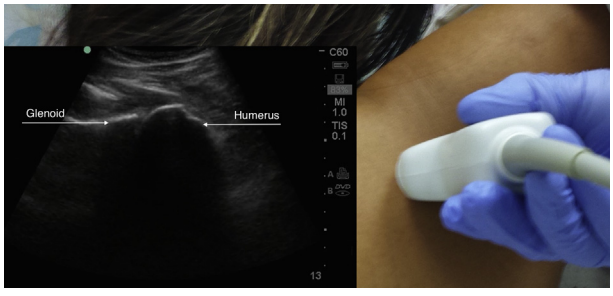

Figure 1 Posterior approach to viewing the glenohumeral joint with arm held in abduction. The glenohumeral joint on ultrasound with probe indicator lateral to the patient.

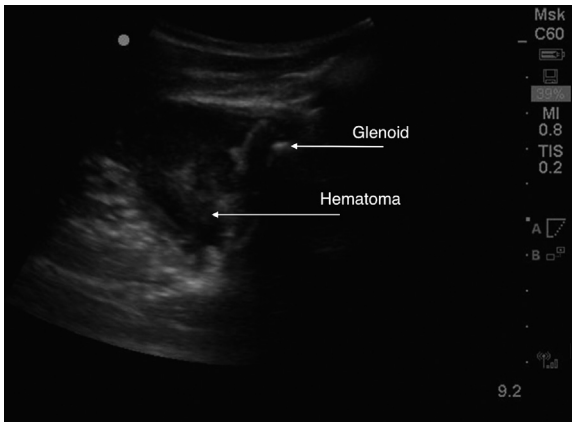

Figure 2 Glenohumeral joint visualized with empty glenoid fossa, large hematoma, and no humerus seen with probe indicator lateral to the patient.

Despite receiving IV morphine, the patient continued to be in significant pain. Therefore, a glenohumeral intra-articular block was performed. Sterile technique was used including sterile gloves, needle, US probe cover, and chlorhexidine skin cleansing. The transducer was positioned on the posterior shoulder as described above so that the gleaned fossa was visualized. Approximately 3 mL of 1% lidocaine with epinephrine were used to create a wheal in the lateral posterior shoulder just anterior to the lateral border of the transducer (Figure 3). Next, a 22-gauge 2.5-inch spinal needle was directed medially and parallel or "in line" with the transducer so that the entire length of the needle could be seen throughout its path towards the joint. The needle was visualized entering from the lateral side of the screen and advancing towards the glenohumeral joint. Several small injections of lidocaine were made in the deeper tissues as the needle was advanced. Once inside the joint, 10 mL of lidocaine were injected, seen as an expanding area of black or anechoic fluid in the joint (Figure 4) [2].

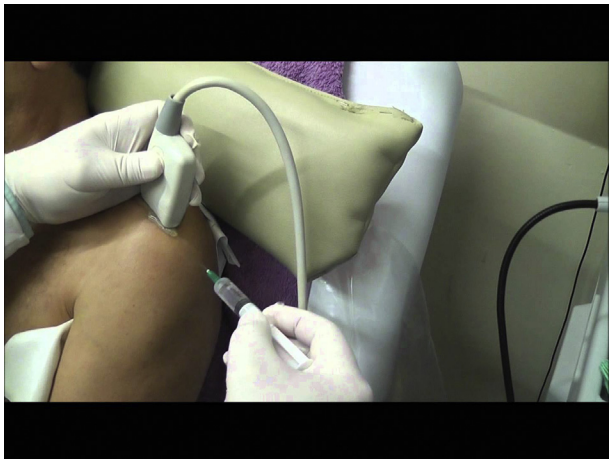

Figure 3 Demonstration of lateral approach of spinal needle for intraarticular injection. This demonstrates a superior to inferior approach with the ultrasound probe (https://i.ytimg.com/vi/9j2G6sxOUuc/maxresdefault.jpg).

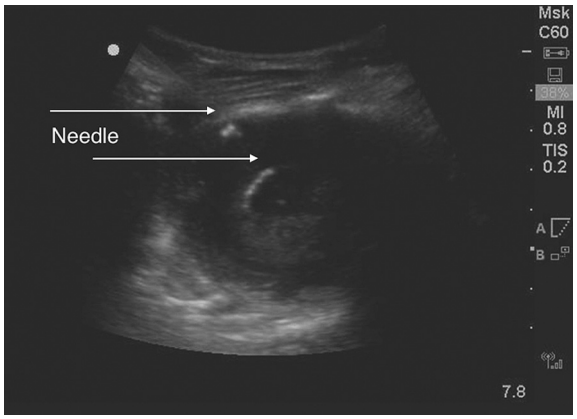

Figure 4 Glenohumeral joint visualized with spinal needle inserted into hematoma and joint space for intraarticular lidocaine with probe marker lateral to the patient.

Case conclusion

Radiography of the shoulder confirmed the diagnosis of inferior shoulder dislocation (Figure 5). A successful reduction was achieved using the traction counter-traction technique. Visual confirmation of reduction was immediate using POC-US. The humeral head was positioned appropriately in the glenoid fossa post-reduction. The patient was placed in a Velcro shoulder immobilizer. Radiography confirmed successful reduction with no fractures (Figure 6). Postreduction neurovascular examination was unchanged.

Figure 5 Radiograph of right shoulder showing inferior dislocation. Surgical clips noted from prior mastectomy.

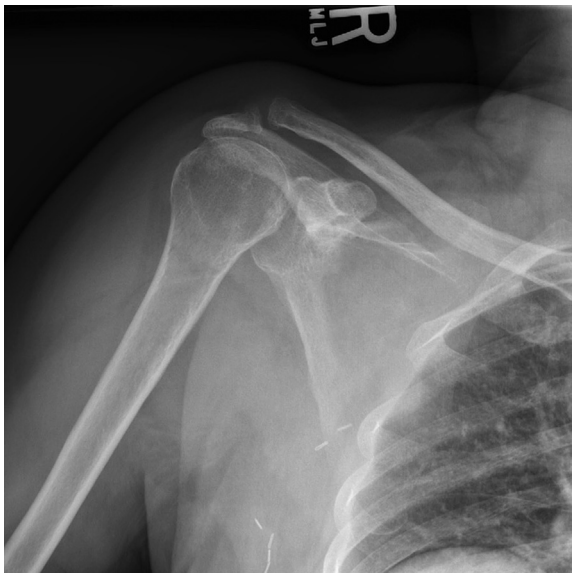

Figure 6 Radiograph of right shoulder confirming successful reduction with no fracture.

Discussion

Luxatio erecta, or inferior shoulder dislocation, is the least common of shoulder dislocations representing only 0.5% of cases. Anterior and posterior dislocation are seen in 94% and 5% of cases, respectively [3]. The mechanism of injury leading to luxatio erecta most commonly involves forces, indirect or direct, that cause hyperabduction of the humerus. This causes an inferior stress of the humeral head and disruption of the glenohumeral capsule and the rotator cuff [4]. Up to 80% of cases are associated with rotator cuff injury or fracture [5] The classic presentation is demonstrated when the arm is locked in a hyper-abducted state above the head with a pronated forearm. Approximately 60% of patients have nerve dysfunction of the axillary nerve, brachial plexus or radial nerve [6].

POC-US has been shown to be accurate in the diagnosis of shoulder dislocation and confirmation of reduction. A small prospective observational study showed 100% sensitivity in detection of shoulder dislocation and 100% sensitivity for confirming the reduction [7]. This can range from a fast-track area to the intubated multisystem trauma patient with a shoulder deformity. Figure 2 demonstrates an easy-to-identify large hematoma which is present in many dislocations which may point a physician to further imaging and management. It also presented a large target to aim for when attempting to provide anesthesia with intraarticular lidocaine (IAL) as seen in Figure 3.

The IAL approach for anesthesia during closed shoulder dislocation reduction has been shown to produce equal analgesia when compared to IV analgesia [8,9]. First described in 1991 it has many advantages including reducing the need for procedural sedation with its associated risks and decreasing length of ED stay [2,10]. It has

also been shown to be more cost-effective than procedural sedation. A Cochrane review showed fewer adverse effects and a shorter recovery time with IAL compared with IV analgesia [9]. Another review of IAL showed a success rate 95% using US or fluoroscopy compared with 79% when performed blind [11].

While some studies suggested that IAL may decrease successful reduction compared with IV sedation [12], a Cochrane review of nine studies showed equal analgesia between IAL and IV analgesia with or without sedation. Procedural sedation for our patient would have required the attention of at least two nurses, two physicians, a respiratory therapist, and a pharmacist. Her ED stay would have been significantly longer considering the time required to complete presedation paperwork, prepare sedation medications, and monitor postsedation. A dreaded possibility for any sedation is that once the patient is awake, radiography will show failed reduction, necessitating repeat sedation, which is less than ideal. And while generally safe, sedation is not without its risks, particularly for patients who are older and have multiple comorbidities. By contrast, IAL has few serious adverse effects, especially when performed with US guidance. Additionally, length of stay may be minimized by decreasing time to reduction and eliminating the need for sedation.

Why should an emergency physician be aware of this?

Luxatio erecta is an uncommon disease, but has considerable complications. This case demonstrates that POC-US can expedite the diagnosis of shoulder dislocation in a timely and cost-effective manner. US-guided IAL can aid with analgesia and minimize the need for sedation, which is safer in patients who are at risk for complications of sedation. Finally, POC-US provides immediate bedside confirmation of successful reduction. While radiography will continue to be important in the management of shoulder dislocation, particularly to evaluate the presence of fracture, POC-US may decrease ED length-of-stay by expediting diagnosis, minimizing the need for sedation, and preventing failed reduction films.

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